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UnityPoint Health



Assessment of Neonatal Abstinence Syndrome:

Standard Scoring of Infants using the Finnegan Scoring Tool



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Welcome to Assessment of Neonatal Abstinence Syndrome - Standard Scoring of Newborns using the Modified Finnegan Scoring Tool

- This Computer Based Learning (CBL) Module is designed to be used as a self study guide.
- The goal of this self study guide is to improve our care of babies at risk for NAS by improving the consistency with which we score these babies.
- This CBL includes some basic information about NAS and step by step instructions for using the Modified Finnegan Scoring Tool



Part 1: Facing the Problem

- Drug use in women is an increasingly important problem in our society. Although reports of drug use are generally lower among pregnant women than non-pregnant women, it has been reported that among pregnant women ages 15-44:
 - 4.5% report use of illicit drugs
 - 11.9% report binge or heavy drinking
 - 15.3 report tobacco use



Newborn Exposures

- Drug use among pregnant women can lead to problems in the developing fetus including congenital anomalies, problems with growth, preterm labor, withdrawal or toxicity in the newborn, and later problems with neurodevelopment. One of the most readily apparent problems created by in utero exposure to drugs is neonatal abstinence syndrome. Like the rates of maternal drug use, the rates of neonatal abstinence syndrome are increasing
- Number of infants coded at discharge with NAS
 - 7,653 in 1995
 - 11,937 in 2008



Neonatal Abstinence Syndrome

- Neonatal Abstinence Syndrome (NAS) describes withdrawal of the newborn from drugs that the mother was taking during pregnancy. Newborns can withdraw from many different types of drugs that they may be exposed to in utero. However, when we talk about NAS we are talking about withdrawal from opioids.

Common Opioids

- Morphine
- Codeine
- Heroin
- Hydromorphone (Dilaudid)
- Fentanyl
- Methadone
- Buprenorphine

What are Opioids?

Opioids are drugs that can be either natural or manufactured that interact with receptors in the brain to produce pain relief. Other effects of opioids include sedation and euphoria.



Opioid Dependence

- When babies are exposed to opioids for prolonged periods of time before birth, their bodies become physically addicted to this drug.

Opioids inhibit release of norepinephrine from nerves in the brain

With chronic opioid exposure tolerance develops and more norepinephrine is produced by the brain to overcome the inhibition

When opioids are suddenly taken away large amounts of norepinephrine are released and produce the physical signs of withdrawal



Opioids in Pregnancy

- Opioids are small fat soluble compounds that can easily pass the placental and blood-brain barrier. Fetuses are getting the same effects as mom. This can present a difficult challenge to the mothers care provider

If the mother stops using opioids her fetus will be at increased risk for distress and fetal loss



There must be other options!



Maintenance

- To avoid causing withdrawal in the fetus in utero, pregnant women are usually maintained on a synthetic long acting opioid (Methadone) or opioid-like drug (Buprenorphine).
- Advantages – minimize opioid craving in mother, minimize withdrawal symptoms in mom, block heroin induced euphoria, prevent fetal stress, engage mother in health care system
- Disadvantages – longer lasting NAS in newborn after delivery



Methadone

- Methadone is full opioid agonist. This means that it will interact with the brain in the same way that morphine does.
- Methadone has a very long half life (mean half life is 22 hours)
- Methadone for management of addiction is not a prescription drug. Mothers must go to the methadone clinic every day to get their dose



Buprenorphine

- Buprenorphine – also known as Subutex – is a newer semi-synthetic opioid.
- Buprenorphine is a partial agonist: it binds opioid receptors in the brain but is not very active.
- Buprenorphine has an important advantage over methadone – it can be prescribed to women who can pick up weeks worth of doses at one time. This makes buprenorphine a more popular choice for women in rural or remote areas.



Methadone vs. Buprenorphine?

- Health care providers have much more experience caring for babies born to women maintained with Methadone. Buprenorphine is a newer drug and data about NAS after Buprenorphine use is limited. A large study known as the MOTHER study compared the effects of Methadone and Buprenorphine on NAS.

Infants born to mothers treated with Buprenorphine had:

- Shorter hospital stays
- Shorter treatment duration for NAS
- Lower cumulative dose of morphine
- BUT up to 50% are reported to have severe withdrawal

BUT- Mothers treated with Buprenorphine were more likely to seek additional illicit drugs



Question 1

During the neonatal period, the most significant risk to a fetus exposed to opiates in utero is:

- a. Congenital anomaly
- b. Preterm labor
- c. Growth restriction
- d. Withdrawal from drug
- e. Drug toxicity



Answer: D

- Drug exposure during pregnancy can lead to congenital anomalies, preterm labor, growth restriction, withdrawal from a drug, or toxicity from a drug. Because many women use more than one class of drug during pregnancy this can be difficult to sort out. However, the most significant problem for a newborn with exposure to opiates in utero is withdrawal from the drug.



Question 2

The most common substances that lead to Neonatal Abstinence Syndrome (NAS) include

- a. Morphine
- b. Methadone
- c. Buprenorphine
- d. Heroin
- e. Hydromorphone
- f. All of the above



Answer: F

- All of the choices listed are members of the opiate class of drugs. All of the drugs easily cross the placenta and the blood brain barrier and lead to physical dependence in the mother and the fetus. Abrupt cessation of these medications after delivery can lead to withdrawal in the newborn. Opiates are the most common class of drug leading to withdrawal symptoms in newborns, but we know that certain antidepressants (SSRI medications) benzodiazepines, barbiturates and alcohol can also lead to withdrawal symptoms.



Question 3

Morphine and Buprenorphine are two drugs that are commonly used during pregnancy as maintenance therapy. The advantages of maintenance therapy for pregnant women include maintaining exposure to an opiate to prevent physical withdrawal, minimizing high risk behaviors and exposures, and optimizing prenatal care. The most important thing to be aware of when caring for a newborn exposed to methadone or buprenorphine in utero is:

- a. Low bioavailability to the fetus
- b. Long half life of maternal medication
- c. Dose of maternal medication
- d. Frequency of maternal dosing
- e. All of the above



Answer: B

- The most important thing to be aware of when caring for a newborn exposed to methadone or buprenorphine maintenance therapy is the long half life of these medications. Withdrawal usually starts between 24-72 hours of life but may be delayed until 5 to 7 days of age or later. Methadone and buprenorphine both cross the placenta and blood brain barrier and are readily bioavailable to the fetus. The effect of maternal dose and frequency of dosing on the incidence and severity of NAS is less clear and there is conflicting evidence around this topic.



Part 2: Clinical Presentation of NAS

- One of the most challenging aspects of NAS is that it is difficult to predict which babies will experience no withdrawal, mild symptoms, or severe NAS.

55-94% of babies exposed to opioids in utero will develop signs of NAS

No clear correlation between dose of maternal opioid and severity of withdrawal

Clinical presentation and course of NAS depends on many factors

- Opioid of choice
- Maternal drug history
- Maternal and Infant metabolism
- Placental metabolism
- Exposure to other substances.



Polydrug Exposure

- Another challenging aspect of NAS is the interplay between opioid withdrawal and withdrawal from other substances the fetus may have been exposed to. SSRIs, and Tobacco are common co-exposures and have symptoms that are similar to NAS. Benzodiazepines, barbiturates and alcohol are also known to cause withdrawal signs in infants.

Timing of onset of withdrawal signs can be a clue to what substance the newborn is withdrawing from

- Alcohol – 3-12 hours
- Barbiturates – 1-14days
- SSRIs – hours to days
- Benzos – hours to weeks
- Tobacco – first 24 hours of life
- Short acting opiates: Heroin, Oxycontin – within 24 hours
- Long acting opiates: Methadone, Buprenorphine – Between 24-72 hours



Differential Diagnosis

- Also – it is VERY important to keep in mind other things that can cause NAS-like symptoms in babies. Many of the diseases in the differential diagnosis can be ruled out by history or by simple lab tests. Sometimes babies experiencing withdrawal need to be more carefully evaluated for co-morbidity.
 - Hypoglycemia
 - Hypocalcemia
 - Hyperthyroidism
 - Intracranial hemorrhage
 - Sepsis
 - Neonatal encephalopathy
 - Metabolic disease
 - Exposure to other drugs – think tobacco and SSRIs
 - Hyperviscosity



Signs and Symptoms of NAS

- Opioid receptors are concentrated in CNS and GI Tract. Signs and symptoms of opioid withdrawal reflect CNS irritability, autonomic instability and GI dysfunction

CNS Irritability

- Tremors
- Irritability
- Increased wakefulness
- High-pitched crying
- Increased muscle tone
- Hyperactive deep tendon reflexes
- Exaggerated Moro reflex
- Seizures
- Frequent yawning and sneezing

Autonomic Instability

- Increased sweating
- Nasal stuffiness
- Fever
- Mottling
- Temperature instability

GI Dysfunction

- Poor feeding
- Uncoordinated and constant sucking
- Vomiting
- Diarrhea
- Dehydration
- Poor weight gain



Modifiers of NAS

Many factors can worsen signs and symptoms of NAS

- Hunger
- Overstimulation



Many factors can improve signs and symptoms of NAS

- Frequent feeding
- Holding and rocking baby
- Swaddling baby
- Keeping a quiet dark environment
- Pacifier use for non-nutritive sucking

NAS and Prematurity

- Premature babies are at lower risk of NAS with less severe course. Why is this? There are different theories:
 - Premature babies have a more immature CNS
 - Total drug exposure may be lower
 - Fat deposits of drug may be lower
 - Assessment tools developed for term babies may not adequately identify symptoms in preterm babies



Question 1

- You are discussing the risk of Neonatal Abstinence Syndrome with a pregnant woman who will deliver at your hospital. She asks you how likely it is that her baby will have withdrawal. Your best answer is:
 - a. Most babies will have some signs of NAS
 - b. There is no clear correlation between dose and frequency of medication and withdrawal
 - c. NAS may be mild, moderate or severe
 - d. Severity of NAS depends on many different factors
 - e. All of the above



Answer: E

- 55-94% of babies exposed to opioids in utero will experience some signs of withdrawal. NAS can be very mild, moderate or severe. It is difficult to predict which babies will have NAS and how severe the NAS will be. There is no clear correlation between maternal methadone dose and frequency of use and the likelihood of withdrawal depends on a wide range of factors including the opioid the fetus was exposed to, maternal drug history, maternal and Infant metabolism, placental metabolism, and exposure to other substances.



Question 2:

- A baby with known methadone exposure in utero is exhibiting some symptoms that are concerning for withdrawal. The most appropriate course of action is:
 - a. Immediately call the on-call physician or newborn care provider to evaluate the baby
 - b. Wait for symptoms to get worse before bothering anyone
 - c. Reassure mom that some NAS symptoms are expected
 - d. Feed baby, create a calm soothing environment, give baby a pacifier and swaddle baby
 - e. Increase the frequency of feeding and evaluating the baby



Answer: A

- It is important to remember that a baby at risk for NAS also has the same risk as other newborns for severe disease. Many symptoms of NAS can mimic infection or metabolic diseases that require timely identification and treatment. It is always important to consider the differential diagnosis and to alert the newborn care provider assigned to the baby if symptoms of NAS develop.



Question 3:

- A baby with a known methadone exposure is born at your hospital. You anticipate that this baby may have some issues with NAS. What are some things that may help minimize symptoms of NAS in this baby.
 - a. Frequent feeding
 - b. Quiet environment
 - c. Low lighting
 - d. Pacifier for non-nutritive sucking
 - e. All of the above



Answer: E

- Many steps can be taken in the Normal Newborn Nursery to create an environment that will minimize signs of NAS. A quiet and calm environment with low lighting and minimal stimulation can help minimize symptoms of NAS. Small frequent feeds to provide adequate calories and prevent newborn from experiencing distress from hunger may also help minimize symptoms of NAS. All of these efforts are called “non-pharmacologic therapy”



Part 3: Assessing NAS

- Determining how much withdrawal a newborn is experiencing is difficult! Symptoms may fluctuate over time, and there are often many providers caring for a baby during the newborn period. Most nurseries use scoring systems to monitor withdrawal symptoms over time in newborns at risk for NAS. Trends in scores over time can help care providers decide how best to care for the infant.



The Modified Neonatal Abstinence Scoring System

- Also known as the Finnegan Scoring System. This was originally published in 1975 in response to increasing numbers of infants born to narcotic addicted mothers at the Philadelphia General Hospital. This scoring tool originally included the 20 most common symptoms of NAS and infants were scored every 1 hour for first 24 hours, every other hour for 2nd 24 hours, every 4 hours after 48 hours.
- The modified Finnegan scoring tool is the most commonly used scoring tool. Modifications to the original tool were made for the purpose of simplifying the tool, making it easier to use, and increasing the inter-rater reliability



Modified Neonatal Abstinence Scoring Tool

- This tool includes 19 items that are weighted depending on the symptoms and the severity. The biggest challenge with using this tool is that it can be very subjective.
- Does it work?
 - Stable median score of 2 during each of the first 3 days of life in infants known NOT to have been exposed to any opioids in utero
 - 95th percentile 5.5 on dol 1
 - 95th percentile 7 on dol 2

SYSTEM	SIGNS AND SYMPTOMS	SCORE	PM				PM				COMMENTS
CENTRAL NERVOUS SYSTEM DISTURBANCES	Continuous High Pitched (or other) Cry	2									Daily Weight:
	Continuous High Pitched (or other) Cry	3									
	Sleeps <1 Hour After Feeding	3									
	Sleeps <2 Hours After Feeding	2									
	Sleeps <3 Hours After Feeding	1									
	Hyperactive Moro Reflex	2									
	Markedly Hyperactive Moro Reflex	3									
	Mild Tremors Disturbed	1									
	Moderate-Severe Tremors Disturbed	2									
	Mild Tremors Undisturbed	3									
	Moderate-Severe Tremors Undisturbed	4									
	Increased Muscle Tone	2									
	Excoriation (Specific Area)	1									
	Myoclonic Jerks	3									
METABOLIC/AUTONOMIC/RESPIRATORY DISTURBANCES	Generalized Convulsions	5									
	Sweating	1									
	Fever 100.4°-101°F (38°-38.3°C)	1									
	Fever > 101°F (38.3°C)	2									
	Frequent Yawning (>3-4 times/interval)	1									
	Mottling	1									
	Nasal Stuffiness	1									
	Sneezing (>3-4 times/interval)	1									
	Nasal Flaring	2									
	Respiratory Rate >60/min	1									
GASTROINTESTINAL DISTURBANCES	Respiratory Rate > 60/min with Retractions	2									
	Excessive Sucking	1									
	Poor Feeding	2									
	Regurgitation	2									
	Projectile Vomiting	3									
	Loose Stools	2									
	Watery Stools	3									
TOTAL SCORE											
INITIALS OF SCORER											



Who should be scored?

- All infants > 35 weeks at risk of NAS should be scored. Newborns with risk factors should be scored even if there is a low likelihood of withdrawal

Risk factors for NAS in maternal history

- Known history of substance abuse
- Unexplained complications of pregnancy
- Maternal medical complications
- Maternal behaviors

Identify signs and symptoms in infant that suggest NAS. If a baby is having behavior that suggests NAS – start the scoring and think about what else might be going on.



And don't forget.....

- If you are going to start scoring think about
 - Maternal urine toxicology screen
 - Infant urine toxicology screen
 - Meconium toxicology screen
 - More frequent vital signs
 - Infant feeding
 - Other health risks to baby



General Guides to Scoring

- Start scoring around 2-4 hours of life, then every 3-4 hours
 - Score baby around 30 minutes after feeding
 - Do not wake infant to score unless scoring interval > 4 hours
- All signs and symptoms observed during a scoring period should be recorded
- Do not score for things that may be associated with feeding or normal infant behavior
- Baby will be observed for NAS with Finnegan scoring for:
 - At least 3 days if baby was exposed to a shorter half life opiate like hydrocodone or heroin
 - At least 5 days if baby was exposed to a longer half life opiate like methadone or suboxone
 - Sub-acute withdrawal symptoms may last up to 4-6 months



HOW TO SCORE: CNS SYSTEM DISTURBANCES



Continuous High Pitched Cry

Many infants with NAS cry more often than babies who are not experiencing withdrawal, and the cry tends to be higher pitched, characteristic of CNS disturbance. The severity of crying should be assessed after the baby has immediate discomfort such as hunger or a dirty diaper alleviated.



- **Score 2** if crying is excessive
 - defined as inconsolable for > 15 seconds or intermittently for < 5 minutes.
- **Score 3** If the cry is continuous
 - defined as inconsolable for > 15 seconds and intermittently for > 5 minutes



Sleeping

- Babies experiencing NAS can have difficulty regulating their sleep and state and cannot settle down to sleep for extended periods. The less time a baby is able to settle for sleep, the higher score should be given the baby. The score should be based on the longest period of sleep during the scoring interval.
- A baby should not be woken up for scoring before 3 hours, but if a baby needs to be woken up to feed after 3 hours, the baby should get a score of 0. Exceptions should be made for the small breastfeeding baby who may need to feed more frequently than every three hours and for older babies who may spend more time in a quiet awake state. The baby spending more time in the quiet awake state can have this time added to sleep time, and the scale can be adjusted for babies needing to eat more frequently to accommodate their needs.



Sleeping

- Use longest single continuous time sleeping since last feeding
 - **Score 0**
 - Sleeps 3 or more hours continuously
 - **Score 1**
 - Sleeps < 3 hours after feeding
 - **Score 2**
 - Sleeps < 2 hours after feeding
 - **Score 3**
 - Sleeps < 1 hours after feeding



Moro Reflex

- The moro reflex is best scored when a baby is in a drowsy or quiet awake state if possible.
- **Score 2** for Hyperactive Moro Reflex
 - Arms stay up 3-4 seconds
 - Pronounced jitteriness of hands during or at end of Moro.
 - Jitteriness defined as rhythmic tremors that are symmetric and voluntary
- **Score 3** for Markedly Hyperactive Moro Reflex
 - Arms stay up more than 4 seconds
 - Clonus (involuntary repetitive jerks or wrist or ankles)



Tremors

- Tremors are one of the most common signs of NAS and one most often looked for when NAS is suspected. Tremors are involuntary movements usually best seen in arms and legs that are rhythmical and of equal amplitude. Tremors that happen when baby is sleeping or at rest in the bassinette are defined as undisturbed and those that happen when baby is being handled are called disturbed.
- A weighted score 1-4 is assigned to a baby experiencing tremors
 - **Score 1:** Mild tremors when disturbed
 - Hands or feet only, lasts up to 3 seconds
 - **Score 2:** Moderate or severe tremors when disturbed
 - Arms and legs, lasting more than 3 seconds
 - **Score 3:** Mild tremors when undisturbed
 - **Score 4:** Moderate or severe tremors when undisturbed

Observe when baby is both disturbed and undisturbed

- **Disturbed = tremors when baby touched or manipulated**
- **Undisturbed = tremors with no touch or manipulation**



Increased Muscle Tone

- Hypertonia is a common sign of NAS. Babies are scored based on resistance to passive movement. There are many ways to assess muscle tone including bending and straightening the arms, looking for head lag when the baby is gently lifted up by the arms, or increased rigidity when the baby is draped prone over the examiners hand.
- **Score 0** for a baby with normal tone
- **Score 2** for a baby with increased muscle tone



Excoriation

- Excoriation is a bit tricky. When the original Finnegan scoring tool was developed babies were placed prone and the score for excoriation described the facial abrasions that occurred when the babies were agitated and rubbed their faces against their blankets. Babies are mistakenly scored for excoriation when they have diaper rash - this should not be scored. Excoriation is really meant to define areas where the skin is red or abraded as a result of the baby being agitated.
- **Score 1** If excoriation is seen on the baby:
 - Record location of excoriations
 - Only score for excoriations the first time they are noted - do not score again after that



Myoclonic Jerks

- Myoclonic jerks are short quick contractions of muscle groups or an extremity. They tend to be one quick jerk, and most often occur when baby is sleeping. These movements are not rhythmic in nature, and should not be confused with tremors.
- If a baby is having a mot of myoclonic jerks it may be worthwhile to consider the possibility of seizures.
- In the modified Finnegan scoring tool found in the AAP guidelines, the presence of myoclonic jerks would be scored as a 3 and would actually contribute substantially to the overall score.
- **Score 3** when myoclonic jerks are noted



Seizure

- Seizure is one of the most concerning signs of NAS. If a baby is noted to be seizing – most frequently observed as rhythmic movements that cannot be stopped or eye deviation or lip smacking – not only should the baby be scored as 5, but should be immediately evaluated by a medical care provider.
- **Score 5 for Seizure**



HOW TO SCORE: METABOLIC, VASOMOTOR AND RESPIRATORY DISTURBANCES



Sweating

- One of the hallmark signs of withdrawal in newborn is deregulation of the autonomic nervous system. In infants sweating is one of the ways that this can be seen. When assessing a baby for sweating, be careful that the baby is not over bundled or being cuddled by a hot sweaty adult. It is pretty uncommon for a newborn to be sweaty due to elevated temperature, but be cautious just the same.
- The best place to look for sweating is on the baby's forehead or the upper lip
- **Score 1 for sweating**
 - Wetness on infants forehead or upper lip
 - Sweating on the back of the neck may be from overheating



Hyperthermia

- Elevated temperatures can be a sign of withdrawal (as well as a sign of infection so you have to be really careful with this one, and make sure you are not missing the forest through the trees)
- Scores for hyperthermia should be based on an axillary temperatures. Infants noted to have elevated temperatures should be examined by a health care provider and then scored appropriately .
- **Score 1** for Temp 101.4°F to 101° F (38.0°-38.3°C)
- **Score 2** for Temp > 101.0° F (38.3°C)



Autonomic Dysfunction

- Additional signs of autonomic dysfunction that may be seen in NAS include yawning, mottling, nasal stuffiness and sneezing. These are all things that can be normal to newborns, but can be more frequent and exaggerated in babies who are withdrawing.
- **Score 1** for Yawning
 - More than 3-4 yawns in a row
- **Score 1** for Mottling
 - Skin looks marbled with of pink and pale or white areas
- **Score 1** for Nasal Stuffiness
 - Occurs when nares are partly blocked from secretions or exudates. Can also happen with overzealous suctioning
 - Nasal noises with breathing
- **Score 1** for Sneezing
 - More than 3-4 sneezes > in a row



Nasal Flaring

- Respiratory disturbances can also be a sign of neonatal abstinence syndrome. A baby who is having signs of respiratory distress should be carefully evaluated as respiratory distress can be a sign of infection, metabolic disease, or mechanical problems in the lungs such as pneumothorax. One of the signs of respiratory distress in newborns is flaring of the nostrils.
- **Score 2** if baby observed to have any nasal flaring



Tachypnea

- Another measure of respiratory distress in the newborn is an increased respiratory rate. Like nasal flaring, any sign of respiratory distress in a newborn must be fully evaluated by a newborn care provider. Respiratory rate should be observed for a full minute in order to get an accurate reading, and baby should not be crying during this minute.
- Infant must be quieted if crying
- Count respirations for a FULL MINUTE
- **Score 1** if respiratory rate >60
- **Score 2** if respiratory rate > 60 WITH RETRACTIONS

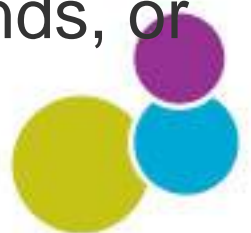


HOW TO SCORE: GASTRO- INTESTINAL DISTURBANCES



Excessive Sucking

- Babies experiencing withdrawal often have frantic rooting or sucking behavior. These babies will suck on their hands, pacifiers and anything that gets near their face. Babies can have such a strong drive to suck that they can even develop blisters on their hands and knuckles.
- **Score 1** if baby is observed to have increased rooting behavior or if baby rapidly swipes hands across mouth in an attempt to suck on fist, hands, or pacifier prior to or after a feeding



Poor Feeding

- One of the most significant issues a baby can have when they are withdrawing is failure to thrive. This is due to excessive metabolic demand combined with excessive losses and inability to take in enough calories due to poor feeding. Feeding can be a huge problem – babies who are withdrawing may have an uncoordinated suck and swallow pattern and may be unable to effectively latch and suck on a breast or bottle despite frantic sucking and rooting when not feeding. Babies may have difficulty coordinating sucking and breathing and may gulp without breathing when feeding.



Poor Feeding

- **Score 2** if poor feeding is observed. Poor feeding behaviors that should be scored include:
 - Infant demonstrates excessive sucking prior to a feeding yet sucks infrequently while feeding and takes a small amount of formula or does not sustain an effective suck/swallow at breast
 - Infant demonstrates an uncoordinated sucking reflex
 - Infant continuously gulps formula while eating and stops frequently to breathe
 - Infant is unable to close mouth around bottle or breast
 - Feedings take > 20 minutes



Vomiting

- In addition to poor feeding, the vomiting that occurs as part of neonatal abstinence syndrome can place newborns at higher risk for failure to thrive. Vomiting in newborns can be classified as regurgitation and projectile vomiting.
 - **Score 2 for Regurgitation**
 - Regurgitates whole feed or regurgitates 2 or more times during feed not associated with burping
 - **Score 3 for Projectile Vomiting**
 - Forceful ejection of stomach contents



Loose Stools

- Finally, diarrhea can be a problem for babies with NAS and can further contribute to failure to thrive. Differentiating normal stools from loose stools from diarrhea in a newborn can be difficult – how do you tell the difference? Loose stools and diarrhea in babies are recognizable by the amount of water in the stool – it will be absorbed by the diaper in much the same way as urine.
- **Score 2** for loose stools
 - Stool half liquid half solid
 - NO WATER RING
- **Score 3** for watery stools
 - Stool more liquid than solid
 - WATER RING



Part 4: Treatment of NAS

- The goals of treating NAS are to make sure that newborns are able to sleep and eat well enough to grow and interact appropriately with their environment. A newborn who is failing to thrive or is too frantic to settle will miss important opportunities for bonding with parents and may have long term developmental consequences.

Non-pharmacologic treatment, or treatment without using drugs, can help some babies

Other babies may need pharmacologic treatment, or treatment with drugs, for their NAS symptoms



Supportive Care

One of the mainstays for treatment of babies with NAS is supportive care, and this should begin immediately in all babies at risk for NAS and be continued even if they require more intensive medical care. Ideally, the components of supportive care will be included in a nursery policy and incorporated in nursing standards of care and in order sets. This reinforces the education of parents on how to care for these often very fussy babies. Supportive care, including swaddling, holding and rocking, keeping a very calm and quiet environment, sticking with small frequent feeds and allowing the baby to suck on a pacifier, are generally very helpful and adequate when scores are consistently below 8.

- Supportive care is also known as “non-pharmacologic care”
- The goals of supportive care are to reduce irritability and promote feeding through:
 - **Tight swaddling**
 - **Holding and rocking**
 - **Quiet dark room**
 - **Limit number of visitors**
 - **Feeding on demand**
 - **Small frequent feeds**
 - **Have pacifier available**



Ways to provide supportive care

- Minimize environmental stimuli
 - Darkened room, low lighting
 - Quiet room
 - Swaddling to prevent auto-stimulation
 - Limited number of visitors
- Respond early to an infant's needs
 - Comforting techniques like rocking and swaying
 - Frequent feeding and formula supplementation to avoid hunger



Treatment of NAS with opiates

- When supportive care is no longer enough to keep a baby growing and interacting, or when babies have complications such as fever or seizures, treating the baby with medications must be considered.
- Goals of therapy are to ensure that the infant achieves adequate sleep and nutrition to establish consistent weight gain and begin to integrate into the social environment
 - Prevent complications such as fever, weight loss and seizures
 - Short term amelioration of clinical signs
- No studies have compared the use of different withdrawal score thresholds for initiating drug therapy



Treatment of NAS

- Treatment with opiates is generally considered when
 - 3 consecutive scores > 8
 - 2 consecutive scores > 12



AAP Recommendations

- There is no one recommended treatment regimen that is considered the gold standard and regimens may differ widely region to region and nursery to nursery.
- AAP does not recommend specific treatment or weaning regimen
 - Limited available evidence supports use of oral morphine solution and methadone
 - Growing evidence that clonidine is effective as primary or adjunctive therapy
 - Phenobarbital commonly used as adjunctive therapy
 - Treatment with paregoric is contraindicated
 - Safety of buprenorphine requires more study



General Guidelines for Treatment

- Babies who require treatment for NAS with opiates should be cared for in a location where they can be monitored because opioids may cause respiratory depression.
 - Admit baby to a nursery where they can be monitored during treatment
- Scoring should continue after the baby is started on pharmacologic therapy and scores should be used to guide the wean of the opiate.
 - Continue scoring every 4 hours with NAS assessment tool
- Use scores to guide management
- Symptom based approach
 - Basic starting dose for all babies and then titrate up or down depending on NAS scores
 - Score of 8 is typically used as threshold for increasing or decreasing dose



Adjunctive Therapy

- Adjunctive therapy may be used as a standard practice in nurseries or on a case by case basis.
- The two most commonly used adjunctive medications are phenobarbital and clonidine.
 - These medications can be helpful in babies who are difficult to control on morphine or methadone alone and can be helpful in babies who have had multiple drug exposures.
- Phenobarbital and Clonidine both have advantages and disadvantages.



Question 1

- The goals of treating infants with NAS are:
 - a. To relieve discomfort and pain that the infant with NAS may be experiencing
 - b. To allow baby to interact appropriately with his or her environment
 - c. To allow baby to eat and retain enough calories to grow and thrive
 - d. To prevent potentially harmful events such as seizures
 - e. All of the above



Answer E:

- a. The mainstay of treatment for NAS is supportive care with a quiet, calm, low stimulus environment. If the infant requires more treatment, the infant is typically started on methadone or morphine and withdrawn slowly from the drug. The goals of treatment of NAS are to relieve discomfort and pain that the infant with NAS may be experiencing, to allow baby to interact appropriately with his or her environment, to allow baby to eat and retain enough calories to grow and thrive, and to prevent potentially harmful events such as seizures.



Question 2:

- One of the challenges of the modified Finnegan scoring tool is the subjective nature of scoring. Every effort should be made to standardize scoring practices in nurseries. For a baby who is being reliably scored for NAS in the normal newborn nursery, what is the best indicator that the baby may need a higher level of treatment?
 - a. A single score of 8
 - b. Two consecutive scores greater than 8
 - c. Three consecutive scores greater than 8
 - d. One score greater than 12
 - e. Two consecutive scores greater than 8 or two scores greater than 12



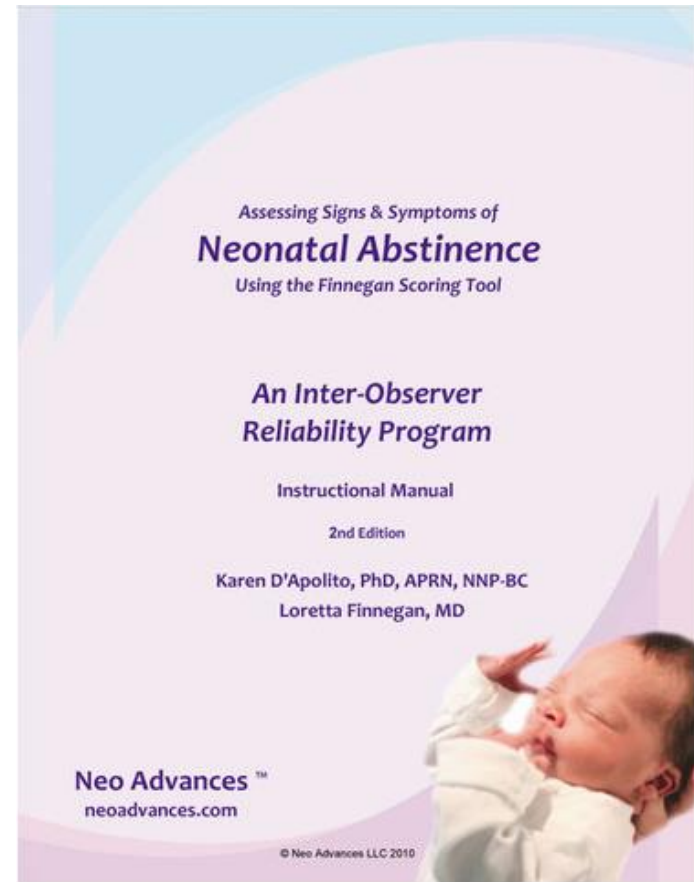
Answer E:

- One of the most useful aspects of the modified Finnegan scoring tool is the ability to track the degree of withdrawal over time. Single elevated scores should not be used as a rationale to start NAS medications, but scores that remain elevated overtime or that increase over time indicate a need to treat the infant. Most nurseries use a threshold of 3 consecutive scores greater than 8 or 2 consecutive scores greater than 12 to start treatment for NAS



More Training Is Available

- Further training in modified Finnegan Scoring is available



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Questions

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